Theory and Evidence-Based Design of Audit and Feedback to Improve Quality of Care

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Acknowledgements

Poll Question #1

- What is your interest in audit and feedback (select all that apply)?
  - I don't know what the term means
  - I am a clinician who receives clinical audit and feedback
  - I am a clinician or administrator who provides clinical audit and feedback
  - I am a researcher who studies audit and feedback
  - I am interested in designing an audit and feedback tool or intervention

Overview

- **Audit and Feedback** -- Background and Theory
- **Research Findings from our Lab**
  - Hysong et al. 2006 – Facilities that implemented clinical practice guidelines more successfully provided timely, individualized, non-punitive, and customizable feedback
  - Hysong 2009 - Feedback needs to be in writing, frequent, and include correct solution information to be effective
  - Hysong et al. 2013 – Feedback for teams needs to be adjusted for teams
  - Hysong et al. 2014 – Feedback is currently not being implemented strategically, and
- **Audit and Feedback in Action**
  - Summary Feedback to Improve Hypertension Management (Petersen, PI)
  - Case-Specific Feedback to Reduce inappropriate diagnosis of Catheter-Associated Urinary Tract Infections (Trautner, PI)

What is Audit and Feedback?

- An quality improvement intervention that involves:

  - measuring an individual's professional practice or performance,

  - comparing it to professional standards or targets and

  - delivering results of this comparison to the individual.

- One of the most commonly used interventions for improving quality of care (Ivers et al., 2012)

Why should we care about Audit and Feedback?

- Practical, reasonably inexpensive intervention

- Intermediate step for other interventions, such as Pay-for-performance and continuing education

- Can be effective by itself, if executed correctly

- Can be harmful, if executed poorly

Traditional Clinical Performance Feedback to Improve Quality of Care

- Traditional clinical performance assessment involves abstracting patient medical records to calculate and compile measures of clinical performance

- Traditional Clinical Performance Measures are:
  - Specific to individual disease conditions
  - Expressed as a percentage of eligible patients who received the desired care or exhibit the desired clinical outcome

- Clinical Performance Measure information is fed back to facilities and physicians

- In best case scenario – individual physicians receive information about their own individual clinical performance

Poll Question #2

- Is audit and feedback effective?
  - Of course it is!
  - Sometimes, it depends on a number of things
  - Only if the underlying data are good
  - Absolutely not

Is Audit and Feedback Effective?

- **2012 Cochrane Review -- Effectiveness of audit and feedback is highly variable**
  - Effectiveness varied from substantially positive (70% increase in desired behavior) to negative (9% absolute decrease) with a median adjusted risk difference of 4.3% absolute
  - Effectiveness depends on baseline performance (lower baseline associated with more effectiveness) and on how feedback is provided
- **Why is A&F Effectiveness so variable?**
  - Because it has been researched **without the aid of theory** (Foy, et al. 2005, Colquhoun et al., 2013)

Lessons from Outside Medicine: Feedback Intervention Theory (FIT)*
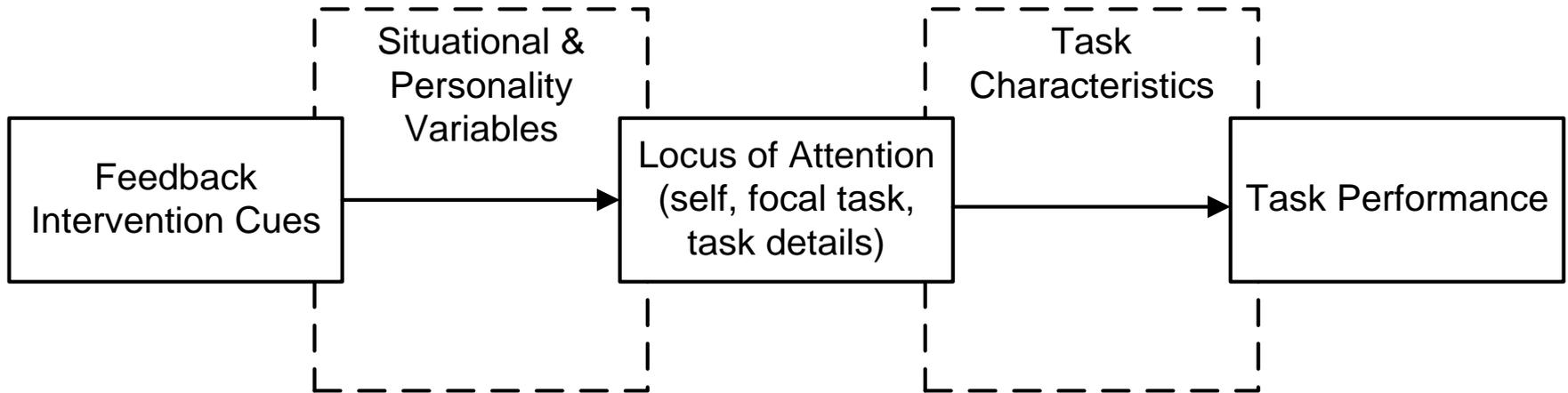
- We regulate behavior by comparing feedback to existing standards
- Feedback interventions work by providing new information that redirect attention
- Anything that redirects attention to the details of the task will make the feedback intervention more effective.

Kluger and DeNisi, 1996

Factors improving feedback effectiveness … a little history

- **Kluger and DeNisi, 1996**
  - 40% of studies in meta-analysis found feedback to be detrimental to performance
  - Factors improving feedback effectiveness included correct solution information, improvement from previous trials, goal setting – *but… no medical studies*

- **Hysong 2006**
  - Facilities providing timely, individualized, non-punitive clinical performance information adapted to clinical guidelines better – *but… data not originally designed to study feedback*

Meta-analysis: Audit and Feedback Features Impact Effectiveness on Quality of Care

Hysong, 2009, *Medical Care*

Results

Effect Sizes, 95% Confidence Intervals, and Sample Sizes for Included Studies

Study Name	Std diff in means	Lower limit	Upper limit	Treatment	Control
Fihn et al ,2004	-0.55	-1.11	0.015	14	14
Lomas et al ,1991	-0.44	-0.99	0.119	19	38
Robling et al ,2002	-0.28	-0.70	0.133	39	53
Heller et al ,2001	-0.06	-0.38	0.263	18	18
Wahlstrom et al ,2003	0.07	-0.73	0.872	12	12
Everett et al ,1983	0.22	-0.59	1.022	13	11
Bentz et al ,2007	0.24	0.03	0.443	10	9
Mainous et al ,2000	0.27	-0.11	0.643	49	62
Bonevski et al ,1999	0.30	0.11	0.485	9	10
Sommers et al ,1984	0.41	0.10	0.722	51	52
Hershey et al ,1986	0.52	-0.06	1.090	24	24
Socolar et al. ,1998	0.55	0.12	0.981	42	45
Raasch et al ,2000	0.69	0.09	1.292	23	22
Moongtui et al., 2000	0.74	0.30	1.169	36	55
Marton et al ,1985	0.88	0.10	1.657	14	14
Anderson et al., 1996	1.05	0.31	1.786	17	15
Berman et al ,1998	1.05	0.24	1.852	13	14
Eccles et al ,2001	1.23	0.84	1.612	62	61
Schectman et al ,1995	1.49	0.69	2.296	43	42
	0.40	0.19	0.603		

Std diff in means and 95% CI

-2.50   -1.25   0.00   1.25   2.50

Feedback Detrimental   Feedback Effective

Note: Ombnibus test, random effects model

FIGURE 2. Effect sizes and 95% confidence intervals of studies included in meta-analysis.

TABLE 2. Summary of Subgroup Analyses for Feedback Characteristics and Meta-Regression of Feedback Frequency on Effect Size

Moderator	No. Studies	Effect Size*	95% CI LCL	95% CI UCL
Correct solution information				
Yes[†]	6	0.78[a]	0.55	10.00
No[†]	12	0.23[b]	0.11	0.34
Not reported[†]	1	0.30[b]	0.11	0.48
Feedback delivered graphically				
Yes	4	0.13[a]	−0.05	0.31
No[†]	11	0.66[b]	0.51	0.81
Not reported	4	0.14[a]	−0.003	0.29
Feedback delivered in writing				
Yes[†]	14	0.49[a]	0.38	0.60
No	3	0.10[b]	−0.07	0.26
Not reported	2	−0.21[b]	−0.58	0.16
Feedback delivered verbally				
Yes	5	0.10[a]	−0.09	0.29
No[†]	11	0.41[b]	0.30	0.51
Not reported	3	0.25[a,b]	−0.06	0.57
Group vs. individual feedback				
Individual only[†]	9	0.31	0.19	0.42
Group only[†]	7	0.34	0.19	0.49
Group and individual[†]	2	0.96	0.40	10.52
Not reported	1	0.07	−0.73	0.87
Feedback delivered publicly				
Yes[†]	5	0.26	0.13	0.39
No[†]	12	0.38	0.25	0.50
Not reported[†]	2	0.78	0.21	10.35
Normative information				
Yes[†]	8	0.32	0.19	0.46
No[†]	9	0.37	0.21	0.54
Not reported[†]	2	0.28	0.11	0.47
Feedback frequency	B[‡]	SE	LCL	UCL
Slope[†]	0.07[†]	0.03	0.009	0.13
Intercept[§]	0.28[§]	0.05	0.18	0.38

*Effect size reported is Cohen's d, the standardized mean difference between groups.

†Denotes effect is significantly different from zero at the 0.05 level.

‡For feedback frequency, reported statistic is the B-weight reflecting the change in Cohen's d per increase in 1 unit of frequency (ie, each additional feedback instance results in an estimated increase in effect size of 0.07).

§Denotes effect is significantly different from zero at the 0.01 level.

Within each moderator, subgroups with superscripts of different letters denote subgroups that significantly differ from each other. Subgroups of a moderator without lettered superscripts do not significantly differ from each other.

CI indicates confidence interval; LCL, lower confidence limit; UCL, upper confidence limit.

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Current Patterns of Audit and Feedback in Primary Care Settings

HYSONG, TEAL, & HAIDET, 2012 *IMPLEMENTATION SCIENCE*
HYSONG, KNOX, AND HAIDET, 2013 *JOURNAL OF GENERAL INTERNAL MEDICINE*
HYSONG, ET AL., 2014, ACADEMYHEALTH ANNUAL RESEARCH MEETING

How is clinical performance feedback currently provided?

- The "how" of audit and feedback in health care is still predominantly a black box (Ivers et al., 2012)

- We sought to understanding how facilities that differ in levels of clinical performance perceive clinical performance data and use it as part of their quality management plans:

  – Mental models and perceptions of clinical performance feedback

  – Feedback delivery strategies

Methods

- **Participants** – 1 physician, 1 nurse, ACOS Primary Care, facility leadership (either director or COS) at each facility

- **Procedure**
  - Pre-interview fact finding re: EPRP process
  - Hour long telephone interviews
  - Transcription of interviews for coding
  - Iterative process of coding and interviewing

Site Characteristics and Interviewees

Performance Category	Site	Size (# unique patients)	Residents per 10k patients[†]	Primary Care Presence[††]	N of Primary Care Personnel	Interviewee Role			
						FD	ACOS	MD	RN
High Performers	B	27,222	0.00	0.12	35	✓	✓	✓	✓
	H	27,851	8.62	0.14	62		✓		✓
	M	43,845	18.25	0.07	56	✓	✓		
	R	49,813	31.42	0.26	83			✓	
Consistently Moderate	D	44,022	26.18	0.12	115	✓	✓	✓	✓
	E	63,313	10.63	0.66	94	✓	✓	✓	✓
	K	46,373	56.93	0.04	125	✓	✓	✓	
	P	80,022	21.45	0.37	54		✓		✓
Highly Variable	A	60,528	23.15	0.09	143	✓	✓	✓	✓
	G	49,309	26.24	0.14	27	✓		✓	✓
	L	21,327	7.03	0.18	30			✓	✓
	Q	39,820	2.89	0.30	10	✓	✓		
Low Performers	C	44,391	27.51	0.12	88	✓	✓	✓	✓
	F	19,609	0.00	0.10	46	✓	✓	✓	✓
	J	58,630	24.94	0.16	116	✓	✓	✓	✓
	N	24,795	0.00	18.02	23			✓	✓

Findings

Changes in site performance 2008-2012

2008

2012
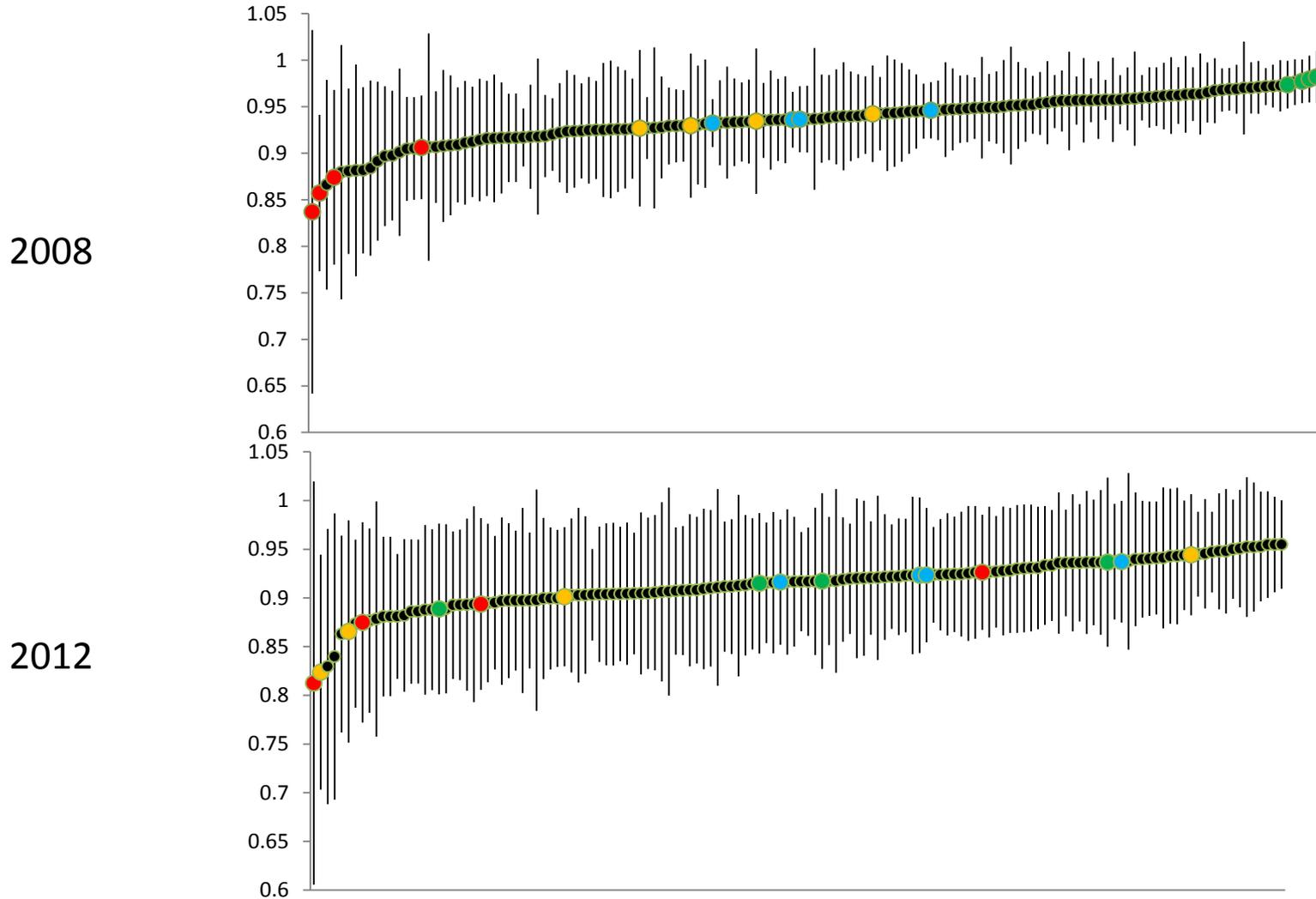
Common Audit & Feedback Strategies
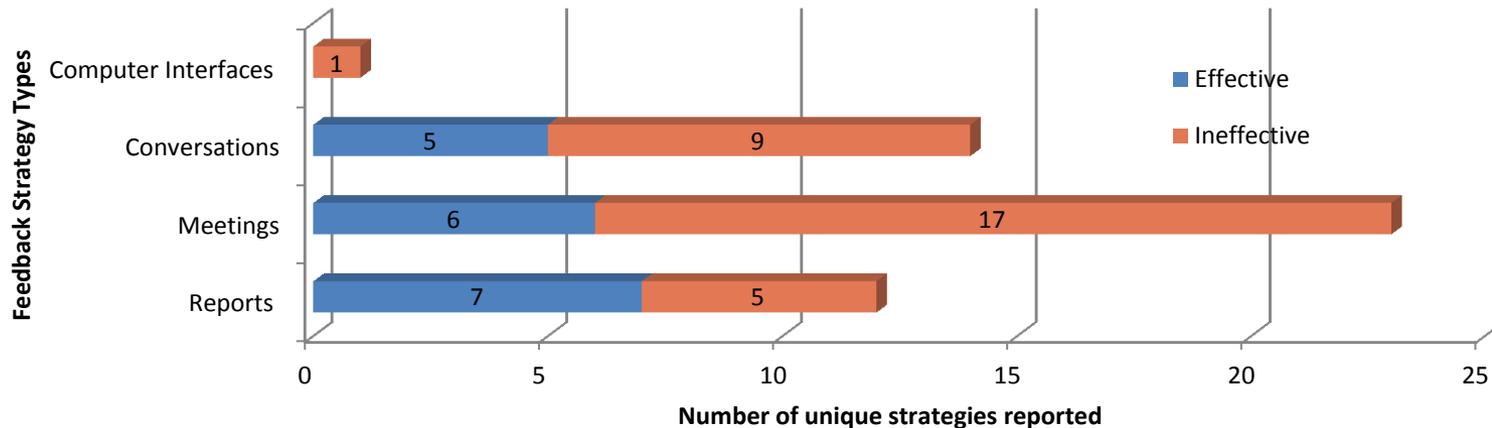
- **Computer interfaces** for feedback, either facility specific or national
- **Meetings**
  - either dedicated for feedback or general in which feedback was incorporated,
  - led by either leadership or clinic staff;

- **Written reports based on EPRP data**, sometimes locally generated
- **Informal conversations**, among peers or between supervisors and subordinates.

- **No meaningful relationship** between these strategy types and facilities' clinical performance, either in 2008 or 2012.

So which strategies were most effective?

Most consistent with effective feedback characteristics

Strategy	Richness	N of sites
Individual EPRP reports	2	4 (25.0%)
Clinical Reminder Report Poster	2	2 (12.5%)
Provider Feedback to Nurse	2	4 (25.0%)
Primary Care Council meetings	2	2 (12.5%)
Provider to provider mentoring	2	1 (6.3%)

Richness score: (sum of effective FIT-related characteristics) – (sum of ineffective FIT-related characteristics).

Least consistent with effective feedback characteristics

Strategy	Richness	N of Sites
Meetings with nurse manager	-2	2 (12.5%)
Primary Care Provider meetings	-2	7 (43.8%)
Morning Meeting	-2	4 (25.0%)
Clinic meetings w/ Team leader	-2	2 (12.5%)
Individual Meeting with Team Leader	-2	1 (6.3%)
Primary Care Retreat	-2	2 (12.5%)
Performance measure meetings	-3	3 (18.8%)
Meetings w/ Providers not meeting measures	-4	8 (50.0%)
Primary Care nurse meetings	-6	4 (25.0%)

Mental Models of Audit and Feedback

**Negative
Mental Models**

**Neutral / Mixed
Mental Models**

**Positive
Mental Models**

Clinical Performance Data not a Good Representation of Quality
(Sites C, K, L*, M)

If it's not the data, it's me and my team
(Site L*)

Feedback as a Means to an End

Benchmarking
(Site H)

Clinical Performance Data has made us hyper-vigilant
(SITE F)

No feedback until shift to team-based care
(SITE J)

Strategic Alignment
(Site A, Site D)

Transparency
(Site B)

Special Focus Areas

- Clinician Acceptance
- Feedback to Teams

HYSONG, ET AL., 2014, *JOURNAL OF GENERAL INTERNAL MEDICINE*
PAYNE & HYSONG, 2016, *BMC HEALTH SERVICES RESEARCH*

Special Focus: Physician Acceptance

- The extent to which a feedback recipient is accepting of the feedback they receive (feedback acceptance) can impact the effectiveness of feedback regardless of feedback characteristics (Anseel & Lievens, 2009)
- Limited research exists regarding medical professionals' uptake or response to clinical-performance feedback
- We conducted a special analysis to determine:
  - which aspects of the audit and feedback process impact physicians' acceptance of clinical performance feedback.
  - what actions physicians take when receiving performance feedback, and if receiving feedback results in physicians altering their patient-management behavior.

Model Depicting Impact of Performance Feedback on Physician Patient-Management Behavior
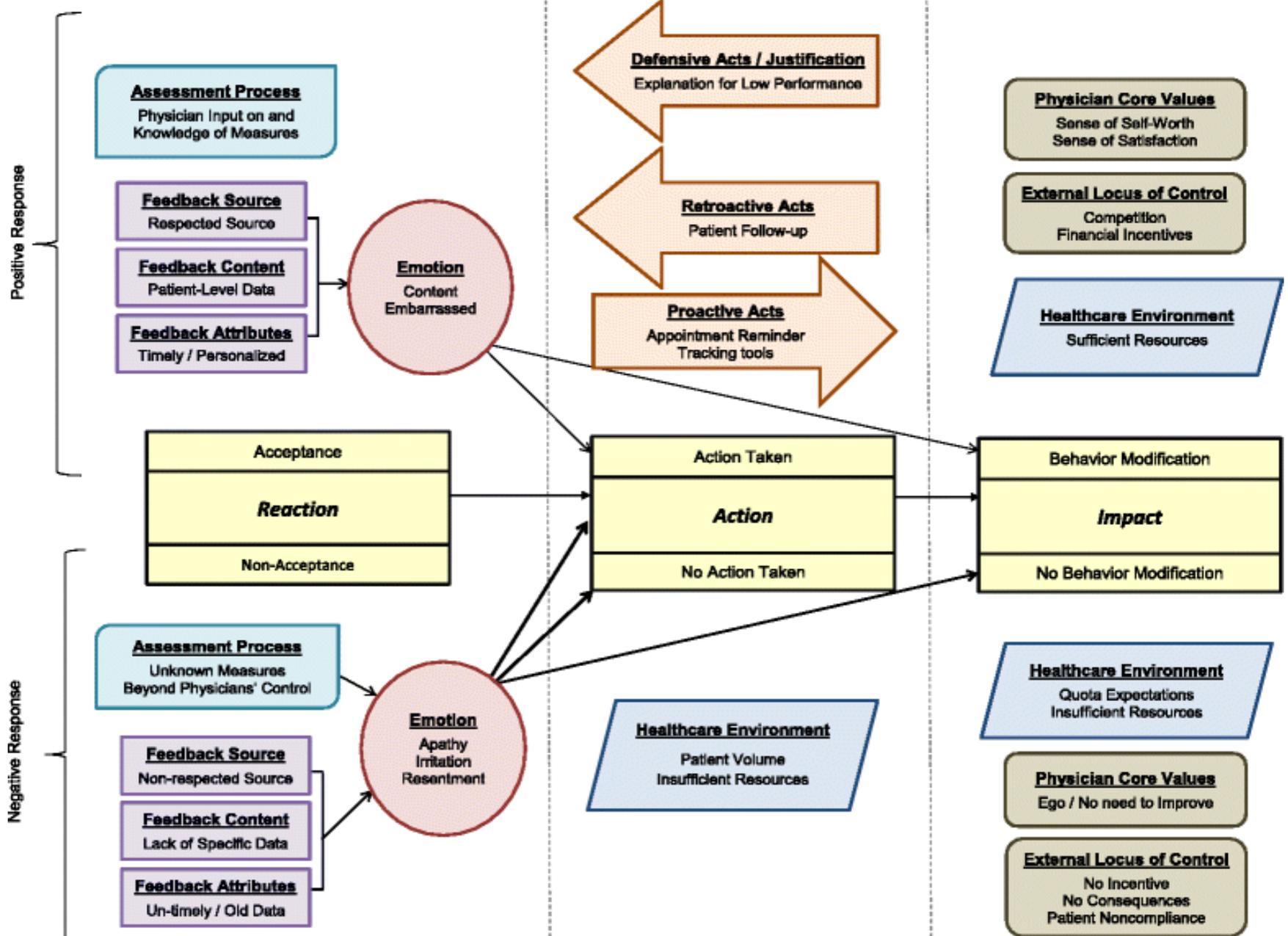
Special Focus: Delivering Audit and Feedback to Teams

- Management and psychology research suggests feedback to teams may require different strategies to achieve effectiveness

    - Mitchell & Silver (1990) - giving individual goals to members of a team resulted in decreased team performance

    - Crown & Rosse (1995) - "groupcentric" goals (individual goals focusing on contributions to team performance) combined with team goals led to the highest team performance

    - DeShon *et al.* (2004) - parallel processes exist for individual- and team-level goals and feedback, and that team members will perform to whichever feedback level provides the most and highest-quality feedback

- We conducted a special analysis examining changes to feedback strategies and mental models as a result of the shift to Patient Aligned Care Teams

Findings

[Theme 1](): Ownership of Clinical Performance Still Rests Largely with the Physician

[Theme 2](): Newest feedback tool is not optimally aligned for teams

[Theme 3](): Clinical Performance Feedback Tools Most Useful to Team When Managed by a Non-Physician

[Theme 4](): Clinical Performance Assessment Has Not Changed Since Transition to Team-Based Care

How Can We Provide Better Audit and Feedback in Health Care?

PETERSEN ET AL., 2013, *JAMA*
TRAUTNER ET AL., 2014, *AMERICAN JOURNAL OF INFECTION CONTROL*
HYSONG ET AL., 2016, *IMPLEMENTATION SCIENCE*
**HYSONG ET AL., 2016, *BMJ QUALITY AND SAFETY***

Example 1: Summary Feedback to Improve Hypertension Management

- **Objective:** Help physicians meet guideline-recommended goals for controlling patients' hypertension.

- **Participants:** 77 primary care physicians at 12 geographically dispersed VAMCs.

- **Behaviors to be changed:** Prescription of guideline-recommended hypertension therapy, blood pressure control, and appropriate clinical response to uncontrolled blood pressure according to the guidelines established in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7).

- **Intervention:** Over 20 months, participants in all study arms received five web-based A&F reports at 4-month intervals. Reports displayed each physician's (and in some cases their clinic's) percentage scores for: each of the aforementioned behaviors. Suggested performance goals for the subsequent period were also included.

Example 1: Summary Feedback to Improve Hypertension Management

Your Scores This Period	# of patients (%)	You earned
Number of **eligible hypertensive patients** randomly sampled from your panel/group	40	
Number of patients who received **guideline-recommended BP medications**	33 (83%)	$300.30
Congratulations! You are among the top 10% of performers across the entire study for this outcome period		
Number of patients with **controlled BP**	29 (73%)	$263.90
Number of patients with uncontrolled BP...	11 (28%)	
... who received appropriate treatment this period	04 (36%)	$36.40
Total Earnings		
This period – Congratulations! Good work!		$600.60
Overall		$600.60
Your Goals for the Upcoming Period	**% of patients**	
Percent of eligible hypertensive patients in your panel/group...		
... who will receive guideline-recommended BP medications *For the next period, your goal is to maintain or exceed your current performance level on this outcome. Keep up the great work!*	83%	
... with controlled BP	82%	
... with uncontrolled BP who will receive appropriate treatment	77%	
If you meet or exceed your goals next period, you and your group could earn at least:	$627.90	

Percent of Eligible Patients with Blood Pressure at Goal Each Period

- **Feedback Elements**
  - Graphical and written format
  - Goal setting
  - Normative information
- **Results**
  - Physicians reported that the feedback delivered by this intervention was more useful and meaningful than what they regularly receive from their facilities.
  - Prescription of guideline-recommended hypertension therapy improved significantly (p<0.01) for all study arms over the course of the study in unadjusted analyses.

30
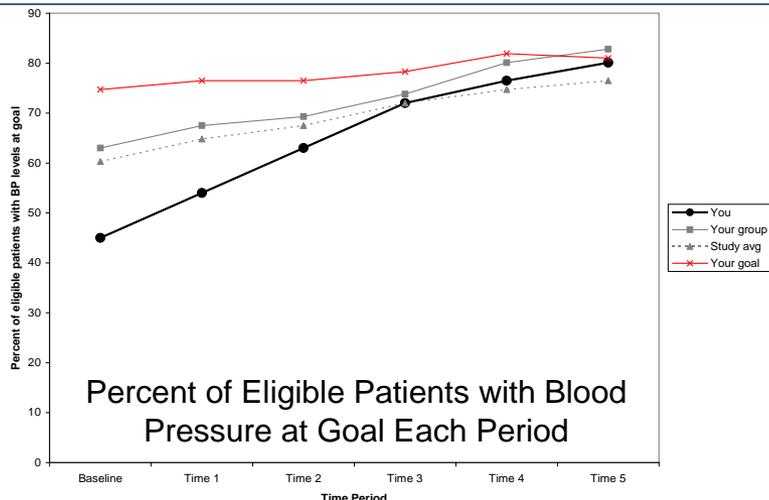
Example 2: Case-Specific Feedback To Reduce Inappropriate Diagnosis of CAUTI

- **Objective**: Improve VA medical residents' capacity to distinguish between asymptomatic bacteriuria (ABU) and catheter-associated urinary tract infection (CAUTI).

- **Participants**: 154 internal medicine residents at two VA Medical Centers (VAMC) in the southwest.

- **Behaviors to be changed**: Inappropriate diagnosis and treatment of ABU as CAUTI. ABU cases were identified via chart review by trained experts using a treatment flowchart derived from the Infectious Diseases Society of America (IDSA) guidelines for the non-treatment of ABU.

- **Intervention**: Trained experts contacted residents to deliver case-specific feedback face-to-face. For each case, a flowchart was prepared and used as an explanatory device during the feedback meeting (Fig. 1). Experts then reviewed the flowchart verbally with the resident step by step, using a standardized script.

Example 2: Case-Specific Feedback To Reduce Inappropriate Diagnosis of CAUTI

- **Feedback Elements**
  - Graphical format
  - Correct solution information
  - Standardized, task-based content
  - Neutral in tone
- **Results**
  - 40% reduction in unnecessary screening for ABU, compared to control site (P=0.04, Wilcoxon).
  - Specificity in diagnosing ABU improved from 0.63 to .79, versus from 0.71 to 0.74 at the control site
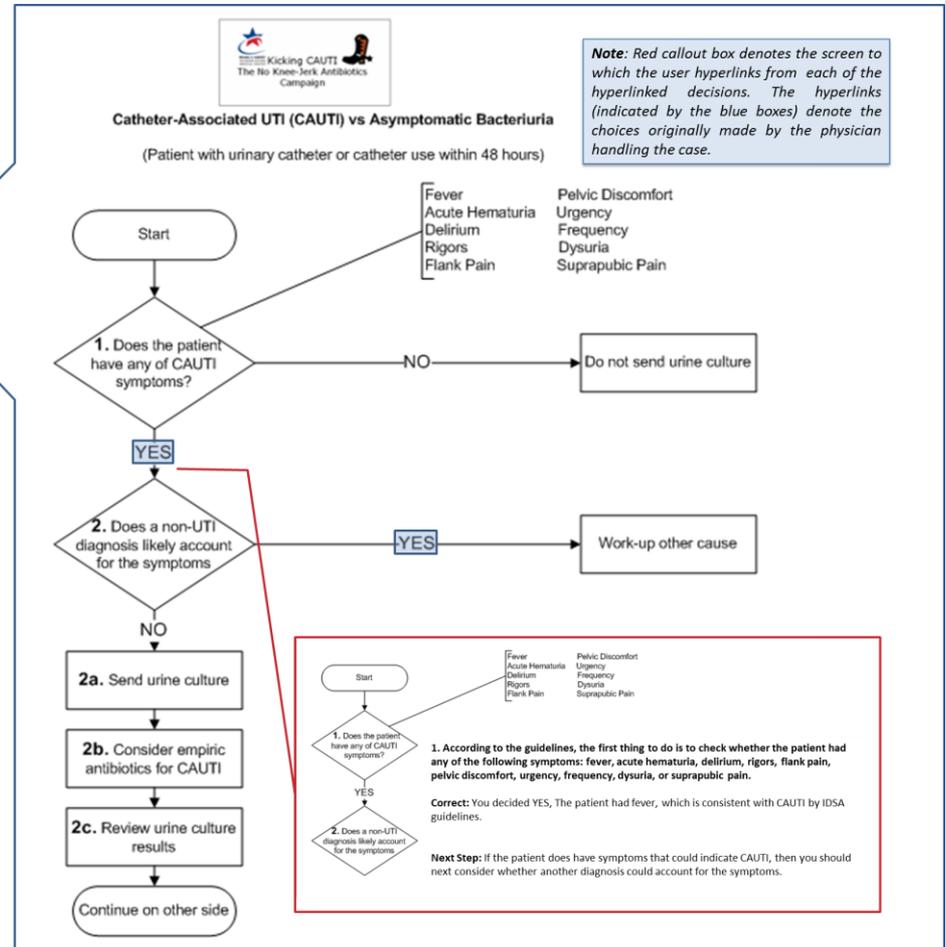
So What Have We Learned?

- Historically, audit and feedback has been studied atheoretically in health care research
- Theory and empirical evidence indicate the design elements of a feedback intervention can impact its effectiveness
- Currently, audit and feedback is not being implemented in an evidence-based manner
- Executed properly, audit and feedback can be highly effective at improving quality of care

Where to next?

- **Designing feedback for teams**
  - Feedback at the team level
  - Credible source
  - Prioritized according to value
  - Built-in time to reflect and debrief

- *Identifying and Delivering Point-of-care Information to Improve Care Coordination* (Hysong SJ & Petersen LA, PI's). VA HSR&D CRE-12-035 currently ongoing.

- *Designing Audit-and-Feedback for Primary Care Teams: Impact on Quality of Care* (Hysong SJ, PI). VA HSR&D IIR Application currently under review.

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Thank you!

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BACKUP SLIDES

- Quotes from PACT paper
- Quotes from Mental Models paper

EPRP Not a Good Representation of Quality (Sites C, K, L*, M)

We can for example demonstrate that we have a patient diabetes blood sugars in control over time. And we can demonstrate that in ... the hemoglobin A1Cs, successive visits; those kinds of things. And the EPRP standards that they've been given by VA Central Office may be that there has to be a visit within a certain timeframe and that there needs to be a note from the provider. You know specifically making a conclusion about the blood sugar and so because we didn't have exactly the thing they were looking for, even though we had a wealth of evidence to show this patient was in good control; it shows as a failure.

-- Site C Facility Director

EPRP has made us hyper-vigilant (SITE F)

There's just a lot of pressure ... it seems like leaders are under and you know, I'm in a position where I try to buffer some of that so that my providers don't feel the pressure but when performance measures and ... things are being looked at, um and it comes down ... through our, our electronic medium almost instantly, um ... it's very hard for people to feel, feel comfortable about anything.

-- Site F Physician Director

If it's not the data, it must be me (Site L)

I'd start worrying and looking at why or what am I doing that's causing it to be like this. Is it the way they pull the data? Because it's random … they pull, I believe anywhere from 5 to 10 of your charts … So I do ask that and then if it is a true accounting then I go "OK then it's me. It's gotta be me and my team." I look at what my team is doing or what portion of that, that performance is performed by my staff and what portion of it is by me. And then from there I go OK. Then I weed it out.

-- Site L Physician

No feedback until PACT (Site J)

Since PACT has been started there's been a progressively increasing awareness of and active monitoring of and active efforts to distribute this kind of information; whereas before PACT um I don't think there was much of a data stream of this type of information reaching us.

-- Site J Physician Director

Benchmarking (Site H)

You benchmark what your model or your goal or your best standards of care are, and that is basically on the spectrum that embodies the whole patient, all the way from the psychological aspect to the community aspect or the social workers too. …That's the way that I see EPRP. EPRP is only you try to just set up several variables that you can measure that at the end of the day will tell you, you know what, we are taking a holistic approach to this patient and we are achieving what we think is best in order to keep this patient as healthy as possible.

-- Site H Physician

Strategic Alignment (Site A, Site D)

I think the VA … they are wise in connecting what they feel are important clinical indicators with the overall performance measurement and the performance evaluation of the director so that the goals can be aligned from the clinical staff to the administrative staff and we've been very fortunate. We've gotten a lot of support here.

-- Site A Physician

Transparency (Site B)

We try to be totally transparent. Uh sometimes to the point of uh being so transparent people can see everything … and sometimes they may not sound good but if you consistently do it I think you know people understand that.

-- Site B Facility Director

Theme 1: Ownership of Clinical Performance Still Rests Largely with the Physician

- Although great efforts had been made to transition to a team-based model of care, feedback about clinical performance was still structured largely according to the individual provider model

    - *In my clinic, … we distribute the data to the team, which usually gets handed to the provider … but it stays in my hands only momentarily before my RN takes it to begin getting into the meat of the- the information and identifying who to call and who to arrange for labs for; things like that.*

        — Site J Primary Care Director

    - *Dr. A's patients are getting better compared to Dr. B's patients and all that.*

        — Site D primary care nurse

Ownership… continued

- *What I can tell you is the tools that are being built for comparing performance across teams are now shared, so our historical model is we would just engage the provider … and now we're sharing that information uh on- probably uh on the- with the team; not just the provider.*

  -- Site J Facility Director

- *It has been mentioned and I think we signed up to get access [to the Almanac] but that's all. … And we may have had like a little brief in-service but, you know it didn't translate to anything. … in the ideal world I think this [panel management] would be under my job description; that I would be tracking them, and that they wouldn't be getting lost; and, you know, I had some great big huge database that I was allowed to do that, and chronic disease management, I guess. …. I may have the tools available to me . I have no idea how to use them.*

  -- Site J Nurse

Theme 2: Newest feedback tool is not optimally aligned for teams

- Most facilities reported using the Primary Care Almanac, a nationally deployed, intranet-based portal that allows tracking of clinical performance, as their primary feedback tool
- Can be viewed and aggregated at multiple levels, including by facility and provider – but not by team or by other individual team members
- Attitudes ranged from positive, to preference toward home grown tools:
  - *The Almanac is, as you know, the –a way for each … provider to look at his or her own group of patients, if you will, their flock, and to see how everyone's doing and who specifically is not doing well… and so I think that's probably the most profound and powerful tool … that we have now at the provider level.*
    - *Site N Primary Care Director*
  - *The dashboard is similar to the Almanac. It's a very nice system. … The dashboard for us is shared, …on our website so our nurse care managers and our clerical staff can get in there, and we have a very coordinated approach, … that's why we really like the dashboard because it's a very detailed and effective tool that can be accessed and used by a lot of different people to work on the same goal*
    - *Site E Physician*

Theme 3: Clinical Performance Feedback Tools Most Useful to Team When Managed by a Non-Physician

- Many physicians perceived clinical performance feedback tools as most useful to physicians when another person (especially nurses) was available to monitor and manage the information they contain.

  - *What we find is that, when the RNs are where we distribute the data to, particularly, we made a lot of in-roads on the hemoglobin A1C parameter because just identifying who needed to come in and have blood work shifted the numbers significantly and by just having the RNs go through the data, identifying those patients who needed to come in for labs and arranging for them to come in for labs was a very successful intervention.*

    — *Site J Primary Care Director*

Theme 4: Clinical Performance Assessment Has Not Changed Since Transition to Team-Based Care

- We found little evidence that clinical performance was assessed any differently since transitioning to a team-based model of care.

  - *"Indications of quality of care are the same under PACT"[1]*
    - *Site C Facility Director*

  - *"With regards to EPRP and clinical-practice outcomes, I'd have to say the jury may be still out in terms of the way that [...] the implementation of PACT has made any changes"*
    - *Site A Facility Director*

  - *"The implementation of PACT has not affected our clinical-outcome results"*
    - *Site E Facility Director*

[1]PACT: "Patient-Aligned Care Teams", VHA's name for team-based model of care